

THE DIETS OF TEN LOW-INCOME WHITE FAMILIES

by

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INTRODUCTION

The economic status of the United States between the years of 1932 and 1936 resulted in an increased number of unemployed persons to be cared for at public expense. The problem of meeting the dietary needs of these families adequately has been of interest to various administrative agencies and workers in nutrition. This study was made to contribute information as to the adequacy of the food of certain low income families living in Kansas and to compare the results with similar studies made of groups on the same income level in different sections of the country.

REVIEW OF LITERATURE

A two-week study of the food purchases of 233 families on relief in Alameda County, California was made by Okey and Luck (11) in 1934. These families were receiving grocery orders supplemented by an undetermined amount of Red Cross flour. The average expenditure for groceries per day per adult male unit was 18 cents. With this sum, augmented by the flour, the authors believed these families could have purchased an adequate diet if all of the baking had been done at home. However, the food as they consumed

it, compared with accepted standards was deficient in all nutrients, supplying only 2551 Calories, 63 grams protein, 0.65 gram calcium, 1.08 grams phosphorus, and 0.0108 gram iron per adult male unit per day. The nutrients particularly low in the diet were iron, phosphorus, and vitamins B and C.

Another survey was made by Okey working with Smythe (10) in 1933 of food purchased by 25 families dependent on the Berkeley Welfare Society in Berkeley, California. Each family was given an order for food to be purchased at a certain grocery store with only general restrictions on choice.

The study showed a marked deficiency in use of fruits, vegetables, and milk. Too many sweets and fats were purchased. Although the average consumption of calcium, phosphorus, and iron was above the standard set for this dietary study of 0.7 gram calcium, 1.2 grams phosphorus, and 0.013 gram iron, 44 per cent of the families were below the standard for calcium, 40 per cent for phosphorus, and 36 per cent for iron. All but one family had an adequate supply of protein.

In 1933, Stiebeling and Ward (16) made recommendations for a series of diets at four levels of nutritive content and cost. These provided standards for: (1) restricted

diets for emergency use, (2) adequate diets at minimum cost, (3) adequate diets at moderate cost, and (4) liberal diets. The minimum and moderate cost adequate diets provided nutrients for maintenance and growth and some margin of safety, but the liberal diet was more generous, providing for better than average nutrition.

For each of these diets they estimated the quantities of foods or food groups required, the nutritive value of the diet, and the retail cost of the food supply as a whole. The food varied from diet to diet because some foods yielded more nutritive value than others for a given sum of money.

In the low cost diets, more grain products, dried legumes, and potatoes were used. Vegetables, fruits, lean meats, fish, and eggs were consumed in larger amounts in the diets of higher cost and more adequate nutritive content. Dairy products were included at all levels but more generously in the three adequate diets.

A week's survey of the diets of low-income families was made by Wiehl (18) in 1933 in nine localities in the United States, viz., Baltimore, Birmingham, Cleveland, Detroit, New York, Pittsburgh, Syracuse, a cotton-mill area in South Carolina, and a coal-mining district in West Virginia. Her study indicated that in general, when the weekly food expenditure was less than \$2.00 per person the

average energy value of the food supply was nearly 20 per cent below the standard of 3,000 Calories per day per adult male unit. In New York City, however, the Calories were low for families spending less than \$4.00 weekly per person. Relief families in New York City, with the exception of those on work relief, had a higher average energy intake than the poorest non-relief groups. The families in all communities on the lowest income levels used very little milk, vegetables, and fruits.

A study made during the years of 1934 to 1936 by Stiebeling (17) of 1400 families in the North Atlantic States showed that larger amounts of foods containing good quality protein, minerals, and vitamins were bought by the families who spent more money for food. About five times as much citrus fruit, three times as much other fruits and vegetables, and two or three times as many dairy products were purchased by the families spending \$4.00 per person per week for food. Only about 30 per cent of the North Atlantic families had diets which were adequate. In the families spending \$2.50 or less per person per week, three out of four had diets that failed to meet one or more minimum essentials. Calcium and vitamins A and B were the nutrients most frequently lacking in the diets. With an expenditure of \$4.00 per person per week, 19 per cent had

fair diets and only four per cent had poor diets and these were attributed to lack of knowledge and poor managerial ability on the part of the homemaker, rather than to lack of funds. The findings of this study show that education in food values and nutrition needs are of more importance than a maximum expenditure for food.

A survey in the southern United States of 426 white and 284 Negro families was made as another part of the study (17). In comparing the results of the findings of the North Atlantic with those of the southern industrial families, inadequate diets were found to be more frequent in the south than in the north, but the southern families spent less per person than the northern ones. Over four-fifths of the Negro families were spending even less than \$2.50 per capita per week which was lower than the food expenditure of the southern white families at the same income level.

A third survey, a part of the same study, included Pacific Coast industrial families. The Pacific families spending approximately the same amount per person per week as the North Atlantic families had more adequate diets, which were attributed to the availability, lower price, and larger consumption of fruits and vegetables in the Pacific region.

Over three-fourths of the Pacific families spending \$4.00 or more per person per week for food were buying a sufficient quality and quantity for health and an adequate diet. With wise selection of food, high grade diets were possible for over one-third of the families spending \$2.75 per capita per week.

The combined results of this study in three different sections of the United States showed that as the expenditure for food increased per capita, the percentage of families having adequate diets also increased.

In conclusion, Stiebeling (17) said:

Some families need to apply more effectively our present knowledge of food and nutrition to their food selection problems, and so get better diets with the money now available; also a realization of the importance of good nutrition and care in choosing an assortment of food which gives the best returns in nutritive value for the money spent, would enable a large proportion of the families now on poor diets to secure food adequate for their nutritional needs. Milk is an economical source of several important food values, calcium, phosphorus, protein of good quality, vitamin A and vitamin G, and it is excellent as a pellagra-preventive. Because milk provides cheaply many of the food elements that cereals lack, milk and grain products together should form a large share of low-cost adequate diets. But milk and its products such as butter and cheese are also important in liberal diets. Without a generous supply, it is very difficult to obtain enough calcium, needed not only for building strong bones and teeth but for promoting a high level of general health.

Cowles (3) in 1935, reported the findings of a week's study of the winter food consumption of 109 Wisconsin families. The diets in 13.5 per cent of the cases were deficient in all five nutrients considered, i. e., Calories, proteins, calcium, phosphorus, and iron. Some deficiency was evident in 31.6 per cent of the cases while in 22.8 per cent the deficiency amounted to 10 per cent or more. The greatest proportion of the diets were deficient in iron. Calories were low for 26.3 per cent of the families. Some calcium deficiency occurred in 15.6 per cent and serious deficiency in 10.5 per cent. Protein was the nutrient most frequently adequate probably due to the availability of meat, eggs, and milk, without direct expenditure of money. The food cost of seven per cent of the families was less than \$1.50 per adult male unit per week or 21 cents per capita per day. In 16 per cent of the families the average food cost was less than 26 cents daily, while 24.6 per cent consumed food amounting to \$2.70 or more per week and 45.6 per cent used food to the value of \$2.40 or more per adult male unit per week. The average food expenditure for all the families was \$2.29 per week or about 33 cents per day per adult male unit.

The food consumption over a two-week period of 36 relief, 31 commodity relief, and 36 non-relief families in

the land purchase area of Forest County, Wisconsin, was included in another report by Cowles in 1935 (4). The cost of food per adult male unit per day was 23 cents for the commodity relief families, 28 cents for work relief, and 30 cents for non-relief families. Foods produced at home were evaluated at retail prices. The amount of food yielded by the farms amounted to about 43 per cent of the value of the food consumed.

The non-relief group had the least adequate diets. This was attributed to their attempt to remain off relief. Over three-fifths of the non-relief diets were deficient in at least one essential while more than seven per cent were completely inadequate. Calcium and iron were the nutrients most frequently deficient in the diets while protein was the one most nearly adequate. As the number in the family increased, the deficiency of the diet also increased. Inadequate diets were often the result of lack of planning, poor management, and unwise distribution of commodities issued. The work relief and non-relief families did "hand-to-mouth" buying which contributed to the inadequacy of their diets.

Gray (7) in 1935 reported a study of three women, two of them college students, who spent for food an average of \$1.82 per person per week. The total expenditure was lowered 21 per cent by the fact that 76 per cent of the food

was purchased at special prices. The average daily intake was 2372 Calories, 41 grams protein, 0.59 gram calcium, 0.79 gram phosphorus and 0.00754 gram iron. The food was deficient in protein and minerals, and though these persons showed no detrimental effects after two years, it was believed the diet could not have been continued indefinitely without being injurious to health.

This investigation showed the effects of careful, intelligent marketing and good managerial ability, but also indicated that a diet obtained at minimum cost is likely to be inadequate in several of the essential nutrients.

Spoelstra (15) in 1936 studied the food consumption of 10 low-income white families living in Manhattan, Kansas. This survey showed that four out of the five families with the lowest food expenditure were in the group which had the most inadequate diets. The money value of the food per adult male unit per day ranged from 12 cents, which constituted the least adequate diet, to 42 cents which included the highest number of essential nutrients.

The results of this study indicated that about 70 per cent of the dietaries were inadequate in most or all of the essentials. Iron was the mineral found to be most deficient and all of the diets were low in vitamins A, C, and G. Six families were lacking in protein and five of those were also

low in minerals. The failure to use sufficient milk and fruits and vegetables as well as the deficiency of protein made it impossible to have an adequate mineral supply. With an increased expenditure for food the adequacy of the diets increased.

A dietary study by Cole (2) in 1937 of 10 low-income Negro families in Manhattan, Kansas showed that 50 per cent of the families were lacking in all the essentials she considered in judging the adequacy of the diets. The remainder of the families were deficient in from one to four of the essential nutrients and no dietary was completely adequate, although one was low only in vitamin A. The five families with the lowest expenditure per adult male unit per day constituted the 50 per cent deficient in all the essential nutrients.

The cost per day per adult male unit ranged from 12 to 48 cents. The family with the highest expenditure for food had the most nearly adequate diet. Of the total average expenditure for the various food groups, 10.9 per cent was spent for dairy products, 21.9 per cent for fruits and vegetables, 32.5 per cent for meats, 18.2 per cent for grain products, and 16.5 per cent for fats, sugars, and food adjuncts. The results of the study showed that too large a proportion of the food money was spent for meats and too

little for dairy products.

PROCEDURE

A 28-day dietary study was made of seven low-income families living in Lincoln County, Kansas in 1936 and of three similar families living in Johnson County, Kansas in 1938.

The families were chosen after consulting the case workers in these counties. The investigator had lived in the first community for six years and in the other for one year, and knew all of the families personally. This simplified the problem of securing their cooperation. Each of the ten families was visited, the purpose of the study explained, their willingness to cooperate assured, and an appointment made for the beginning of the work.

On the second visit, the investigator helped the mother or one of the girls she had in school make an inventory of all the food on hand (form 1), weighing foods of undetermined amounts on household scales. The home record blank (form 2) was explained and left with each family, one for each day, for recording food purchased, food obtained from other sources, food given away, and food eaten between meals. Also it was desired to know the number of guests at meals, and the number of meals taken away from home by any

FORM I
Inventory

Food	:Amount:	Cost per unit:	Total cost
<u>Dairy Products</u>	:	:	:
Butter	:	:	:
Cheese	:	:	:
Cheddar	:	:	:
Cottage	:	:	:
Milk	:	:	:
Condensed (sweetened)	:	:	:
Dried	:	:	:
Evaporated	:	:	:
Fresh	:	:	:
Eggs	:	:	:
<u>Fats and Oils</u>	:	:	:
Fats	:	:	:
Compound	:	:	:
Lard	:	:	:
Oleo	:	:	:
Tallow	:	:	:
Oils	:	:	:
Corn oil	:	:	:
Cottonseed	:	:	:
Olive	:	:	:
<u>Food Adjuncts</u>	:	:	:
Baking Powder	:	:	:
Soda	:	:	:
Cream of Tartar	:	:	:
Salt	:	:	:
<u>Beverages</u>	:	:	:
Chocolate	:	:	:
Cocoa	:	:	:
Coffee	:	:	:
Postum	:	:	:
Tea	:	:	:
Catsup	:	:	:
Cornstarch	:	:	:
<u>Flavorings</u>	:	:	:
Lemon	:	:	:
Vanilla	:	:	:
<u>Gelatin</u>	:	:	:
Plain	:	:	:
Flavored	:	:	:
Macaroni	:	:	:
Olives	:	:	:
<u>Pickles</u>	:	:	:

Form I (cont.)

<u>Sweet</u>	:	:	:
<u>Dill</u>	:	:	:
<u>Salad Dressing</u>	:	:	:
<u>Spaghetti</u>	:	:	:
<u>Tapioca</u>	:	:	:
<u>Vinegar</u>	:	:	:
<u>Spices</u>	:	:	:
	:	:	:
<u>Fruits</u>	:	:	:
<u>Canned</u>	:	:	:
<u>Apples</u>	:	:	:
<u>Apricots</u>	:	:	:
<u>Berries</u>	:	:	:
<u>Cherries</u>	:	:	:
<u>Peaches</u>	:	:	:
<u>Pears</u>	:	:	:
<u>Plums</u>	:	:	:
	:	:	:
<u>Fresh</u>	:	:	:
<u>Apples</u>	:	:	:
<u>Bananas</u>	:	:	:
<u>Grapes</u>	:	:	:
<u>Lemons</u>	:	:	:
<u>Oranges</u>	:	:	:
	:	:	:
<u>Grain Products</u>	:	:	:
<u>Breakfast Foods</u>	:	:	:
	:	:	:
	:	:	:
	:	:	:
<u>Flour</u>	:	:	:
<u>Bread (white)</u>	:	:	:
<u>Cake</u>	:	:	:
<u>Cornmeal</u>	:	:	:
<u>Graham</u>	:	:	:
	:	:	:
<u>Bakery Products</u>	:	:	:
<u>Bread</u>	:	:	:
<u>Cakes</u>	:	:	:
<u>Cookies</u>	:	:	:
<u>Doughnuts</u>	:	:	:
<u>Rolls</u>	:	:	:
	:	:	:

Form I (cont.)

<u>Meats</u>	:	:	:
<u>Beef</u>	:	:	:
Canned	:	:	:
Cured	:	:	:
Dried	:	:	:
Fresh	:	:	:
<u>Veal</u>	:	:	:
Fresh	:	:	:
<u>Pork</u>	:	:	:
Canned	:	:	:
Cured	:	:	:
Fresh	:	:	:
<u>Mutton</u>	:	:	:
Fresh	:	:	:
<u>Fish</u>	:	:	:
Canned	:	:	:
<u>Miscellaneous</u>	:	:	:
Cod Liver Oil	:	:	:
Cod Liver Oil Tablets	:	:	:
Yeast	:	:	:
.	:	:	:
<u>Nuts Etc.</u>	:	:	:
Peanut Butter	:	:	:
Peanuts	:	:	:
Cocoanuts	:	:	:
Cocoanut	:	:	:
Walnuts	:	:	:
.	:	:	:
<u>Sugars and Sweets</u>	:	:	:
Candy	:	:	:
Honey	:	:	:
Molasses	:	:	:
<u>Sugar</u>	:	:	:
White	:	:	:
Brown	:	:	:
Powdered	:	:	:
Syrup (corn)	:	:	:
<u>Vegetables</u>	:	:	:
Canned	:	:	:
Beans	:	:	:
Kidney Beans	:	:	:
Pork and Beans	:	:	:
String	:	:	:
Beets	:	:	:

Form I (concl.)

Corn	:	:	:
Peas	:	:	:
Sauerkraut	:	:	:
Tomatoes	:	:	:
<u>Dried</u>	:	:	:
Beans	:	:	:
	:	:	:
	:	:	:
Peas	:	:	:
	:	:	:
<u>Fresh</u>	:	:	:
Beans	:	:	:
Cabbage	:	:	:
Carrots	:	:	:
Cauliflower	:	:	:
Celery	:	:	:
Lettuce	:	:	:
Onions	:	:	:
Potatoes	:	:	:
Irish	:	:	:
Sweet	:	:	:
Squash	:	:	:
Turnips	:	:	:
Tomatoes	:	:	:
	:	:	:
	:	:	:
	:	:	:

Form II
HOME RECORD

Day of week _____ Date _____ No. _____

Foods Eaten For					
Breakfast	How Prepared	Dinner	How Prepared	Supper	How Prepared

Meals eaten away from home			Foods eaten between meals	
Name of food	How Prepared	Person eating meals	Name of food	By whom eaten

Lunches - School and otherwise		Food fed to pets	
No. taking lunch	Food in the lunch	Pets	What fed

Form II (concl.)

Meals to Guests

Number to Breakfast	Number to Dinner	Number to Supper

[illegible]

members of the family.

The menus for each day were listed as a convenient check for the investigator to account for the food used. The home record blanks were collected daily for the first week, then three times weekly, until the close of the study. Frequent visits helped the family to give correct and complete data.

During the study, the investigator collected interesting facts about each family on records provided for that purpose (form 3). This information helped in understanding the conditions under which the families lived. The personnel of each family was obtained from the case worker's office, and was recorded on form 4. These data gave not only essential information but included helpful remarks about different members of the family as to their individual characteristics.

At the end of the 28-day period a second inventory was taken. The amount of food on hand at the end of the study was subtracted from the sum of the food on hand at the beginning and that obtained by purchase or otherwise during the period. After determining the amount used, adjustment was made for meals eaten away from home and meals served to guests (table 1).

All of the food, produced by a family or received as a

FORM III

Home Situation

Name of the family _____ No. _____

Date _____

Location of home _____
(farm or city)

Ownership _____ Taxes _____ Rent _____

Size of home:

Number of bedrooms _____

Kitchen _____ Size _____

Living Room _____

Other Rooms (list) _____

Kitchen equipment:

Stove (kind) _____

Work table or cabinet _____

Oven _____

Other equipment _____

Pets:

Number of pets _____

Kind (list) _____

Table 1. Computation of meals per adult male unit per day.

Family	Adults	Chil- dren	Adult male units:		Extra meals			Meals per adult male unit					
			Energy	Protein and Minerals	Guest meals	Meals out	Differ- ence	Energy, fat, and carbohydrate			Protein, minerals and vitamins		
								Normal number	Adjustment	Days of	Normal number	Adjustment	Days of
								per period (3x28xA.M.U.)	3 for extra	meals	per period (3x28xA.M.U.)	3 for extra	meals
I	3	1	3.5	3.5	8	11	3 ¹	294.0	291.0	73.6	294.0	291.0	73.6
II	2	1	2.7	3.1	37	9	26 ²	226.8	252.8	84.3	230.4	256.4	85.5
III	2	1	2.5	2.9	6	18	12 ¹	210.0	198.0	66.0	243.6	231.6	77.2
IV	2	7	5.8	8.5	8	0	8 ²	487.2	495.2	165.1	714.0	722.0	240.6
V	1	2	1.8	2.6	0	0	0	151.2	151.2	50.4	218.4	218.4	72.8
VI	3	3	5.5	6.3	3	30	27 ¹	462.0	435.0	145.0	529.2	502.2	167.4
VII	2	0	1.4	1.4	35	2	33 ²	117.6	150.6	50.2	117.6	150.6	50.2
VIII	2	1	2.9	2.9	4	12	8 ¹	243.6	235.6	78.5	243.6	235.6	78.5
IX	2	2	4.0	4.7	0	0	0	336.0	336.0	112.0	394.8	394.8	131.6
X	2	1	2.3	2.7	0	1	1 ¹	193.2	192.2	64.1	226.8	225.8	75.3
Total	21	19	32.4	38.6	101	83		2721.6	2737.6	889.2	3212.4	3228.4	1052.7
Mean	2.1	1.9	3.2	3.9	10.1	8.3		272.2	273.8	88.9	321.2	322.8	105.3

¹This number is subtracted from normal number per period.²This number is added to the normal number per period.³This is 3(number of meals per day)x28(number of days of study)x A.M.U.(adult male unit).

Form IV

Personnel of Family

Name of family _____ Date _____ No. _____

Adults

[illegible]

Children

[illegible]

gift, was evaluated at market price, and from this sum, food given away, likewise evaluated, was subtracted to determine the amount actually used. For example, in the case of one family a quart of milk was given to pets daily which was subtracted from the total amount produced. The actual expenditure and money value were computed for the total amount of food consumed.

The diet for each family was calculated for total cost, grams of protein, fat, carbohydrate, calcium, phosphorus, iron, and units of vitamins A, B, C, D, and G. The calculations using the item-by-item method, were made according to Rose (12) supplemented by Chaney and Ahlborn (1) and Daniel and Munsell (5).

Definite units for each of the vitamins in some foods had not been determined but as many as were available at the present time were used.

Sherman's (14) standards for the average moderately active man of 70 kilograms in weight were used, viz., energy, 3000 Calories; protein, 70 grams; calcium, 0.68 gram; phosphorus, 1.32 grams, and iron, 0.015 gram. Vitamin standards were based on the recommendations of Daniel and Munsell (5) of 4000 Sherman-Munsell units of A, 600 Sherman-Chase units of B, 100 Sherman units of C, and 600 Bourquin-Sherman units of G. Although vitamin D was cal-

culated when possible, its value in the diet could not be determined because of lack of an established standard for the average man.

The families were converted into adult male units according to Hawley's double scale (8) which was modified to include vitamins (table 1). The diets were then compared with the standards set by Sherman (14) and Daniel and Munsell (5) and with the results of other studies on similar families living in Kansas and in other sections of the country.

RESULTS AND DISCUSSION

Personnel of the Families

Families I to VII lived in Beverly, Kansas, numbers VIII and IX in Gardner, Kansas, and family X on a farm just out of the city limits of Gardner. Both of these towns were small with a population of about 450 persons. The living conditions of the families in the two towns were similar although those residing in Gardner did not receive commodities as did those in Beverly.

The ten families studied totaled 21 adults and 19 children and averaged 2.1 adults and 1.9 children or 4 persons per family (table 2).

Table 2. Personnel of families.

Family	Adults per family	Children													Total Adults and children
		Under 6		6-9		10-12		13-14		15-17		Total			
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Both sexes	
I	3										1		1	1	4
II	2									1			1	1	3
III	2									1			1	1	3
IV	2	2	1	1	2		1						3	4	9
V	1	1		1									2	2	3
VI	3			1		1						1	2	3	6
VII	2														2
VIII	2											1		1	3
IX	2									1	1		1	2	4
X	2									1				1	3
Total	21												9	10	40
Mean per family	2.1												0.9	1.0	4.0

Family I lived with an aged grandmother, who owned the home. The housewife supplemented their monthly Works Progress Administration income of \$35.10 by taking in washings and working by the day in homes. They had several conveniences including an electric washer and iron. They heated with gas in winter but used coal and wood for cooking.

Another family (II) consisted of a widow, a 17-year old son, and an adult daughter who worked part time as a telephone operator. They owned their meagerly furnished home and were able to pay their taxes of \$14.00 per year. The cooking was done on a coal range, flat irons were used for ironing, and there were no modern conveniences. The family was allowed \$9.50 monthly at the grocery store for food and received commodities in addition. The monthly food expenditure was supplemented by an ample supply of goat's milk. The mother did any type of work she could find.

Family III was composed of a widow and two daughters who lived in a building that had been the father's pump shop before his death. Their home was poorly furnished; however, they had an electric washing machine and iron. This family had a county food allowance of \$11.50 per month. In addition, one of the girls clerked in a grocery store and the mother did any type of work available.

One family (IV), composed of 9 persons, was crowded

into a small four-room house. The unpapered kitchen, also used as a dining room, was built to the side of the house with a sloping roof which affected the ventilation. There was no opening to the outside except a door. The living room also served as a sleeping room with beds laid on the floor. The conditions of living were far from sanitary in spite of the fact that the mother was a native of Denmark, a country noted for cleanliness. Their diet was improved greatly by the use of a large amount of milk produced by four goats.

Family V consisted of the mother, a native of Ireland, who was a widow, and two boys aged 4 and 8 years. They lived in an old leaky house that belonged to her mother-in-law. In addition to the monthly food allowance of \$7.50, the county supplied one quart of milk daily which was delivered to the home.

Of the ten families studied, number VI lived in the most unsanitary and crowded conditions. Their home was an old 3-room shack that had been used as a work shop. The inside was not plastered and the rooms were unfurnished except for a cook stove, dining table, an old work table, and a few chairs. Cots were used for beds in various parts of the house.

Family VII was composed of an aged mother and an adult

daughter. The daughter worked in the sewing room four days a week for which she received \$32.50 per month. She also did the weekly washing for three families. Their four-room house was scantily furnished but clean.

Families VIII and IX had the best furnished homes of any of the ten cases studied. Family VIII at one time had owned a grocery store but had lost all they had except their home during the first part of the depression period. The house needed repair and repapering but otherwise was comfortable.

The accidental death of the father in family IX had taken away the source of income. Besides her regular work in the sewing room, the mother did any work she could get. Their home was nicely furnished and clean.

Family X, an aged couple and their granddaughter, lived in very unsanitary conditions. Their home, composed of three small rooms, had no daily care. The kitchen had a dirt floor in which there was an old cook stove, table, and boards placed on boxes where the dishes were kept. The old couple had poor health and she was not able to be up part of the time. They were allowed \$11.50 per month at the local store for groceries.

The incomes of the families on work relief ranged from \$32.50 to \$35.19 per month. The county relief was given in

the form of an allowance at the local grocery store, ranging from \$7.50 to \$11.50 per family per month.

Nutritive Value of the Diets

The results of the study of the nutritive value of the diets of ten low-income Kansas families are shown in table 3. After converting the families into adult male units the diets were compared with the standards of Sherman (14) and Daniel and Munsell (5).

Protein was found to be more than adequate in all of the diets except one (IX) which was 14.6 per cent low. The average intake of protein was 86 grams per adult male unit per day which was 22.9 per cent above the standard. The nine families ranged from 8.0 to 45.9 per cent above the standard for this nutrient (table 4). Family IV, which totaled 102.1 grams protein per adult male unit per day, had the highest intake chiefly due to the large amount of milk consumed. Grain products furnished 36.96 per cent of the total protein, while dairy products ranked second with 28.81 per cent (table 5), and meats supplied 20.71 per cent. Almost half (49.52 per cent) of the protein was supplied by animal foods.

The average energy intake per adult male unit per day for the ten families was 2868 Calories. This was 4.4 per

Table 3. Nutritive value per adult male unit of the diets of ten low-income families.

Family	Protein	Fat	Carbohydrate	Calories	Calcium	Phosphorus	Iron	Vitamins				
								A	B	C	D	G
I	94.7 ¹	131.3	475.2	3470 ¹	1.272 ¹	1.787 ¹	.014	4472 ¹	277	137 ¹	19	520
II	99.5 ¹	108.3	408.7	3014 ¹	.808 ¹	1.558 ¹	.013	4544 ¹	230	111 ¹	14	392
III	71.5 ¹	51.6	523.8	2836	.386	.873	.009	2037	184	69	5	159
IV	102.1 ¹	89.6	360.7	2648	.942 ¹	1.273	.008	2849	242	60	16	366
V	90.9 ¹	97.1	578.8	3482 ¹	.630	1.018	.012	1760	253	90	9	209
VI	75.6 ¹	63.9	439.4	2702	.540	1.003	.012	1464	219	73	2	229
VII	96.8 ¹	141.9	276.6	2779	.910 ¹	1.607 ¹	.012	1873	298	53	6	352
VIII	85.9 ¹	108.6	382.9	2849	.812 ¹	1.550 ¹	.015 ¹	6051 ¹	338	121 ¹	458	407
IX	59.8	73.4	243.6	1875	.448	.887	.009	1230	119	43	4	169
X	83.4 ¹	96.9	440.4	3028 ¹	.428	1.256	.017 ¹	4380 ¹	302	44	18	405
Mean	86.0	96.3	413.0	2868	.718	1.281	.012	3066	246	80	55	321
Stand- ard ²	70.0			3000	0.68	1.32	.015	4000	600	100		600
Percentage variation from standard	+22.9			-4.4	+5.5	- 3.0	-20.0	-23.3	-59.0	-20		-46.5

¹Denotes standard or above.²Sherman's standards used for Calories, protein, and minerals; Stiebeling and Ward's for vitamins.

Table 4. Percentage variation from the standard.¹

Family	Protein	Calories	Calcium	Phosphorus	Iron	Vitamins			
						A	B	C	G
I	+35.3	+15.7	+87.1	+35.4	-6.7	+11.8	-53.8	+37.0	-13.3
II	+42.1	+0.5	+18.8	+18.0	-13.3	+13.6	-61.7	+11.0	-34.7
III	+2.1	-5.5	-43.2	-33.9	-40.0	-49.1	-69.3	-31.0	-73.5
IV	+45.9	-11.7	+38.5	-3.6	-46.6	-28.8	-59.7	-40.0	-39.0
V	+29.9	+16.1	-7.4	-22.9	-20.0	-56.0	-57.8	-10.0	-65.2
VI	+8.0	-9.9	-20.6	-24.1	-20.0	-63.4	-63.5	-27.0	-61.8
VII	+38.3	-7.4	+33.8	+21.7	-20.0	-53.2	-50.3	-47.0	-41.3
VIII	+22.7	-5.0	+19.4	+17.4	+ 0.0	+51.3	-43.7	+21.0	-32.2
IX	-14.6	-37.5	-34.1	-32.8	-40.0	-69.3	-80.2	-57.0	-71.8
X	+19.1	+0.9	-37.1	-4.8	+13.3	+9.5	-49.7	-56.0	-32.5
Mean	+22.9	-4.4	+5.3	-3.0	-20.0	-23.3	-59.0	-20.0	-46.5

¹Standard used: 3000 Calories, 70 gms. protein, 0.68 gm. calcium, 1.32 gms. phosphorus, .015 gm. iron, 4000 units vit. A, 600 units vit. B, 100 units vit. C, and 600 units vit. G.

Table 5. Average percentage distribution of nutrients in diets of ten low-income families.

Food Group	Protein	Fat	Carbohydrate	Calories	Calcium	Phosphorus	Iron	Vitamins				
								A	B	C	D	G
Dairy Products	28.81	27.47	5.62	15.22	78.51	41.19	17.77	56.99	22.58	12.67	25.21	65.80
Fats and Oils	.44	42.02		12.28								
Food Adjuncts	.98	1.64	.55	.92	.47	1.59	.78	.03	.22	.54		.02
Fruits	2.45	1.48	8.66	5.77	4.48	7.45	9.84	17.32	21.19	40.94		11.78
Grain Products	36.96	5.16	48.56	34.23	7.80	23.66	29.92	.10	11.74			.58
Meats	20.71	17.44	.03	7.71	1.11	10.8	18.79	2.68	8.44			2.83
Miscellaneous	.04		.01	.01				4.08	.98		74.79	.48
Nuts	2.17	3.37	.30	1.43	.55	1.73	.85		5.02			3.33
Sugar and sweets	.10		26.60	15.43	.19	.02	.35					
Vegetables	8.61	1.41	9.69	6.99	7.02	13.56	21.70	18.79	29.82	45.86		15.18

cent low when compared with the standard of 3000 Calories recommended for an adequate diet. The six families deficient in Calories ranged from 5.0 to 37.5 per cent below standard. Family X had the lowest intake with 1875 Calories while no. VIII was almost adequate with 2849 Calories per adult male unit per day. The four families with a sufficient amount of Calories ranged from 0.5 to 16.1 per cent above the standard. The highest daily intake was 3482 Calories per adult male unit for family V, which was not associated with any unusual degree of activity. Grain products furnished the highest percentage of Calories amounting to 34.23 per cent of the total, sugar and sweets supplied 15.43 per cent, and dairy products 15.22 per cent.

The average calcium intake for the ten families was 0.718 gram which was 5.5 per cent above the standard. Even though the average per adult male unit for calcium was high, five families were deficient in this element ranging from 0.386 to 0.630 gram per day which was 43.2 to 7.4 per cent below the desired amount. Three (I, IV, VII) of the five families (I, II, IV, VII, VIII) consumed per day per adult man the rather large amounts of 1.272, 0.942, and 0.910 grams of calcium respectively. The percentage above standard for the five families ranged from 17.4 to 35.4. Dairy products, a good source of calcium, furnished 78.51 per

cent of this element in the diets; grain products, a relatively poor source but used in large quantities, supplied 7.8 per cent; and vegetables, normally a good source but used in small amounts, contributed only 7.02 per cent.

Phosphorus was adequate in the diets of only four families (I, II, VII, and VIII). The average for the ten families was 3.0 per cent below the desired amount of 1.32 grams per adult male unit per day. Family III, most deficient in phosphorus (-33.9 per cent), was also 43.2 per cent below standard in calcium, and 40.0 per cent low in iron. This family was also very deficient in vitamins ranging from -31.0 per cent for vitamin C to -73.5 per cent for vitamin G. Family I was the most above standard for phosphorus with 35.4 per cent. Dairy products were the best source of phosphorus in the diets supplying 41.17 per cent of the total intake.

Only two families (VIII and X) had adequate intakes of iron. Family VIII met the recommendation of 0.015 gram of iron per adult male unit per day, while family X had a consumption of 0.017 gram which was 13.3 per cent above the standard. This high intake was attributed to a large consumption of whole grain products. If Sherman's (14) new standard of 0.012 gram of iron were used, seven of the families would have had an adequate supply. Grain products

furnished 29.92 per cent of the iron of the diets, vegetables were second with 21.70 per cent, and meats third, with 18.79 per cent.

Six families (III, IV, V, VI, VII, IX) were deficient in vitamins A, B, C, and G which were all that could be evaluated in terms of the adult male unit. None of the diets were adequate in all of the vitamins. Three diets were high in two vitamins each. Although family VIII was 51.3 per cent above the daily standard of 4000 units of vitamin A it was because the daughter was taking a vitamin concentrate which contained 4714 Sherman-Munsell units per capsule. If this amount were subtracted, the diet would have been deficient in vitamin A. The average percentage deficiency for the entire group was 23.3 for vitamin A, 59.0 for vitamin B, 20.0 for vitamin C, and 46.5 for vitamin G.

Dairy products furnished the greatest amounts of vitamins A and G, supplying 56.99 per cent of vitamin A and 65.80 per cent of vitamin G. Fruits and vegetables contributed 17.32 and 18.79 per cent respectively of the vitamin A of the food consumed. Vegetables were the chief source of vitamin B, supplying 29.82 per cent, while dairy products furnished 22.58 and grain products 21.19 per cent. Fruits and vegetables contributed the largest amounts of vitamin C. The 74.79 per cent of vitamin D supplied by miscellaneous foods was due to the vitamin concentrate

taken by a member of family VIII.

The average intake of the ten families for all the nutrients was: protein, 86 grams; Calories, 2868; calcium, 0.718 gram; phosphorus, 1.281 grams; iron, 0.012 (Sherman's new standard); vitamin A, 3066 units; vitamin B, 246 units; vitamin C, 80 units; vitamin D, 55 units; and vitamin G, 321 units. Vitamin D was calculated in the dairy products for each family but was not considered further as there was no accepted standard for the adult male unit at the time the study was made. The food groups furnishing the highest percentage of nutrients in the diets were grain products, dairy products, meats, fruits, and vegetables.

Milk was used quite liberally in some homes (table 6), but in only Family I, consisting of adults only, did they meet the standard of one pint per day per person. Two families (I and IV) had goats which furnished their milk supply. Canned milk was used by four families and family I exchanged labor for fresh milk. Families I and IV, each averaging 0.63 quart per person per day, had the highest milk consumption. Family X, consisting of three persons, used only 6 quarts of milk during the entire period averaging 0.07 quart per day per capita which was the lowest consumption noted. The largest amount used was 159.5 quarts by family IV composed of nine persons. The average milk

Table 6. Milk consumed by the ten families during the four-week study.

Family			Milk				Amount per day	
Number	Members	A.M.U. Pro. and Min. scale	Fresh whole qts.	Skimmed qts.	Evaporated ozs.	Total (equivalent) qts.	Per person qts.	Per A.M.U. qts.
I	4	3.5	70.0			70.0	.63	.71
II	3	3.1	35.5			35.5	.42	.41
III	3	2.9	15.0			15.0	.18	.18
IV	9	8.5	159.5			159.5	.63	.67
V	3	2.6	28.0		21.1 ¹	29.9	.36	.41
VI	6	6.3			508.5 ²	31.8	.19	.18
VII	2	1.4	2.0		174.0 ²	11.9	.21	.30
VIII	3	2.9	31.5			31.5	.38	.39
IX	4	4.7		18.0		18.0	.16	.14
X	3	2.7			97.5 ²	6.0	.07	.08
Mean	4.0	3.9	34.2	1.8	80.1	13.1	.32	.35

¹Sweetened--15 oz. equivalent to 45 oz. fresh milk or 1.4 qts.²Unsweetened--16 oz. equivalent to 1 qt. fresh milk.

intake for the 28-day period for the ten families was 13.1 quarts per family or 0.32 quart per person per day.

The Calories derived from milk and cheese in the diets of these ten families (table 7), averaged 15.2 per cent compared to 14.1 in Cole's study, 14.8 in Spoelstra's, and 24.0 per cent in the adequate diet at minimum cost recommended by Stiebeling and Ward (16). The percentage of Calories obtained from sugars was slightly higher in this study than in that of Spoelstra's and Cole's and over twice that recommended by Stiebeling and Ward for the adequate diet at minimum cost.

The energy furnished by bread, flour, and cereals for Spoelstra's, Cole's, and the present study was slightly higher than the specifications for an adequate diet at minimum cost but lower than the recommendation for the restricted diet for emergency use (table 7).

The Calories supplied by meat, fish, and eggs in this study exceeded those of the restricted diet for emergency use and paralleled the adequate diet at minimum cost and Spoelstra's study. They were much lower than Cole's findings for Negro families.

The Money Value of the Diets

The average total money value of the food per family

Table 7. Comparison of percentage distribution of Calories in the diets.

Diet	Calories derived from -					
	Bread, flour, cereals	Milk, Cheese ³	Vegetables, Fruits	Fats	Sugars	Meats, fish, eggs
Restricted diet for emergency use ¹	43.0	15.0	13.0	16.0	9.0	5.0
Adequate diet minimum cost ¹	32.0	24.0	14.0	15.0	7.0	8.0
Spoelstra's study ²	35.0	13.8	14.8	11.4	14.2	8.2
Cole's study	37.4	7.5	14.1	9.2	13.0	17.7
This study ²	34.2	15.2	12.8	12.2	15.4	7.7

¹From Stiebeling and Ward (16).

²Eggs were included in dairy products.

³Including all dairy products.

was \$24.63 for the 28-day period. The actual money expended for food per adult male unit, for the same time averaged \$6.24 or \$0.22 a day although the money value was \$7.93 for the period or \$0.28 a day (table 8). The difference represented the value of gifts of food or that produced at home. The cost of the food for the individual families ranged from \$0.12 to \$0.33 per adult male unit per day while the money value of the food consumed ranged from \$0.20 to \$0.39. The value of food obtained from other sources was exceptionally high for families II and IV.

Family II had an actual expenditure of \$18.49, but food produced and commodities received increased the value \$10.77 making a total money value of \$29.26. For family IV, the money value of the diet was \$44.06, but only \$18.92 was money actually spent. The difference of \$25.14 represented the value of dairy products produced at home and food commodities issued by relief organizations.

Table 9 shows the ranking of the families as to adequacy of diets and also as to money value. Four of the five families whose diets were in the upper 50 per cent for money value were also in the upper 50 per cent for adequacy. In the same way the five diets lowest in money value included four that ranked in the lower 50 per cent for adequacy. No diet was completely adequate. That of family I

Table 8. Summary of food costs.

	Adult	Income	Total amount	Actual expenditure		Money value		Money value		
Family	male units	per	spent for	Per period	Per day	of food ob-		Per period	Per day	
	(energy)	month	food	per adult	per adult	tained from	Total	per adult	per adult	
				male unit	male unit	other sources		male unit	male unit	
I	3.5	\$35.10 ¹	\$22.95	\$6.56	\$0.23	\$4.95	\$27.90	\$7.97	\$0.28	
II	2.7	9.50 ¹	18.49	6.84	0.24	10.77	29.26	10.83	0.39	
III	2.5	11.50 ¹	12.34	4.93	0.18	4.41	16.75	6.70	0.24	
IV	5.8	35.10 ¹	18.92	3.26	0.12	25.14	44.06	7.60	0.27	
V	1.8	7.50 ¹	12.33	6.85	0.24	2.80	15.13	8.41	0.30	
VI	5.5	35.19	31.89	5.80	0.21	.44	32.33	5.88	0.21	
VII	1.4	32.50	12.86	9.19	0.33	1.10	13.96	9.97	0.36	
VIII	2.9	35.10	26.70	9.20	0.33	4.14	30.84	10.63	0.38	
IX	4.0	32.50	22.27	5.57	0.20	1.15	23.42	5.85	0.21	
X	2.3	11.50 ¹	9.77	4.24	0.15	2.89	12.66	5.50	0.20	
Mean	3.2		18.85	6.24	0.22	5.78	24.63	7.93	0.28	

¹Indicates amount allowed at grocery store. Actual income unknown.

Range Spoelstra's study \$0.116 to \$0.415
 Cole's study \$0.124 to \$0.454
 This study \$0.20 to \$0.39

Table 9. Relationship between adequacy and money value of diets.

Family	Money value of diets per adult male unit per day	Rank of families as to:		Adequacy of diets	
		money value of diets per adult male unit	Rank of families	Nutrients lacking in diet	
I	\$0.28	II	I	Fe. Vit. B, and G.	
II	0.39	VIII	VIII	Cal. Vit. B, and G.	
III	0.24	VII	II	Fe. Vit. B, and G.	
IV	0.27	V	X	Ca. P. Vit. B, C, G.	
V	0.30	I	VII	Cal. Fe. Vit. A, B, C, G.	
VI	0.21	IV	IV	Cal. P. Fe. Vit. A, B, C, G.	
VII	0.36	III	V	Ca. P. Fe. Vit. A, B, C, G.	
VIII	0.38	VI	VI	Cal. Ca. P. Fe. Vit. A, B, C, G.	
IX	0.21	IX	III	Cal. Ca. P. Fe. Vit. A, B, C, G.	
X	0.20	X	IX	All nutrients were lacking.	

ranked highest in quality but was deficient in three of the nine essentials evaluated, i. e., iron and vitamins B and G. It placed fifth in money value and represented approximately three-fourths of the cost of the most expensive diet, that of family II. This diet (II) ranked third as to adequacy. Only family IX had a diet completely inadequate in all essentials. It ranked ninth in money value. The diet of family X representing the lowest money value, 20 cents per adult male unit per day, ranked fourth as to nutritive value.

Family I, ranking first as to adequacy, spent 24.94 per cent of the total money value of the diet (table 10 and 11) for dairy products. Approximately the same amount was spent for fruits and vegetables. Fats and oils and grain products each approximated ten per cent of the value of the diet. Meats and sugar and sweets represented about nine per cent of the money value. If fewer fats and sugars and sweets and more fruits and vegetables had been purchased the diet would have been improved as these would have furnished the needed minerals and vitamins.

Family II, whose diet represented the highest money value, spent 27.34 per cent for dairy products, 4.68 per cent for fats and oils, 15.65 per cent for fruits, 13.81 per cent for grain products, 10.97 per cent for meat, 3.59

Table 10. Percentage distribution of money spent for the various food groups.

Food Group	Family I	Family II	Family III	Family IV	Family V	Family VI	Family VII	Family VIII	Family IX	Family X
Dairy Products	24.94	27.34	10.57	44.12	21.08	13.92	18.34	21.30	11.02	26.07
Fats and Oils	10.04	4.68	3.88	2.88	7.00	7.42	11.10	5.80	6.40	8.77
Food Adjuncts	6.70	9.74	8.59	1.77	6.48	9.06	11.60	7.43	4.39	6.95
Fruits	13.41	15.65	13.31	13.59	13.09	11.78	16.62	14.39	11.14	1.74
Grain Products	10.89	13.81	20.48	9.69	15.14	18.53	15.76	11.57	24.68	28.52
Meats	9.06	10.97	12.89	16.27	16.19	13.52	16.83	12.87	21.43	1.18
Miscellaneous	.36					.62		2.08		
Nuts	.72		.89	.68		.46	1.65	1.23	1.28	3.15
Sugars and Sweets	9.68	3.59	9.79	3.90	10.11	8.13	1.58	11.31	5.81	4.98
Vegetables	14.19	14.18	19.58	7.08	10.91	16.55	6.52	11.99	13.83	18.64
Total	100.00	99.96	99.98	99.98	100.00	99.99	100.00	99.97	99.98	100.00

Table 11. Food cost of the diets of ten low-income families.

Food Group	Family I	Family II	Family III	Family IV	Family V	Family VI	Family VII	Family VIII	Family IX	Family X
Dairy products	\$6.96	\$8.01	\$1.77	\$19.44	\$3.19	\$4.50	\$2.56	\$6.57	\$2.58	\$3.30
Fats and oils	2.80	1.37	.65	1.27	1.06	2.40	1.55	1.79	1.50	1.11
Food adjuncts	1.87	2.85	1.44	.78	.98	2.93	1.62	2.29	1.03	.88
Fruits	3.74	4.58	2.23	5.99	1.98	3.81	2.32	4.44	2.61	.22
Grain products	3.04	4.04	3.43	4.27	2.29	5.99	2.20	3.57	5.78	3.61
Meats	2.53	3.21	2.16	7.14	2.45	4.37	2.35	3.97	5.02	.15
Miscellaneous	.10					.20		.64		
Nuts	.20		.15	.30		.15	.23	.38	.30	.40
Sugars and sweets	2.70	1.05	1.64	1.72	1.53	2.63	.22	3.49	1.36	.63
Vegetables	3.96	4.15	3.28	3.12	1.65	5.35	.91	3.70	3.24	2.36
Total	27.90	29.26	16.75	44.06	15.13	32.33	13.96	30.84	23.42	12.66

Average \$24.63

per cent for sugar and sweets, and 14.18 per cent for vegetables. It would appear that the distribution of the food money among the various food groups could scarcely be criticized.

Family IX whose diet was low in all essentials, spent almost 50 per cent of their food money for grain products and meats. If less had been used for these two food groups and more spent for dairy products, fruits, and vegetables, their diet would have been more nearly adequate.

The proportion of the money value (table 12) of the diets allotted to dairy products and fruits and vegetables by these ten families resembled closely the percentage distribution in the restricted diet of Stiebeling and Ward (16).

The percentage of the food money spent for meats, eggs, and fish, grain products and fats, sugars and food adjuncts was similar to that recommended by Stiebeling and Ward for an adequate diet at minimum cost.

The percentage distribution of expenditures among the food groups of the diets of this study is more like Spoelstra's (15) than Cole's (2) being slightly higher for dairy products, fruits and vegetables, and meats, eggs, and fish but lower for grain products and fats, sugars, and food adjuncts.

Table 12. Comparison with standard budgets of the percentage distribution of expenditures among the food groups.

Food group	Restricted diet ¹	Adequate diet at minimum cost ¹	Food administration budget ²	Money value		
				Spoelstra's study	Cole's study	This study
Dairy products	20-30	30-35	20 or more	22.5	10.9	23.9
Fruits and vegetables	25-30	25-20	20 or more	25.5	21.9	25.8
Meat, eggs and fish	10	15	20 or less	12.9	32.5	13.6
Grain products	20	15	20 or less	19.4	18.2	15.5
Fats, sugars and food adjuncts	20	15	20 or less	19.7	16.5	13.2

¹Diets at four levels of nutritive content and cost, Stiebeling and Ward (16).

²Issued by the United States Food Administration during the World War as part of its educational program (12).

FINDINGS

1. None of the ten low-income families had an adequate diet.
2. One diet was deficient in every essential.
3. Protein and calcium were the only nutrients for which the average consumption was above the estimated need. Only one diet was deficient in protein while five were lacking in calcium.
4. Over half of the families had an inadequate supply of vitamins.
5. Contrary to the customary belief, phosphorus was deficient in the diets more frequently than calcium and iron, if the standard of 0.012 gram be accepted for the latter.
6. The least adequate diet cost \$0.21 per adult male unit per day and was deficient in all nine nutrients evaluated. Another diet averaging \$0.20 a day was lacking in only five nutrients. This would indicate that judgment in choice of food influences the adequacy of the diet.
7. The most expensive diet averaged \$0.39 per adult male unit per day and was less adequate than another costing only \$0.28 a day. Knowledge of food values would appear to increase the efficiency of the food dollar.

8. It appeared that diets costing from \$0.35 to \$0.40 a day could be adequate in these sections of Kansas, provided the housewife had the necessary knowledge of food values to purchase her food intelligently. It would be expected that diets costing less than the amounts suggested would be inadequate even with careful expenditure of the food money.

9. Uncertain amounts of commodities issued at uncertain and irregular times were not always utilized to the best advantage.

10. "Hand-to-mouth" buying, as many of these families practiced, was not conducive to intelligent and wise food marketing.

RECOMMENDATIONS

1. Consumption of more milk would have improved the diets.

2. Fewer sweets should have been purchased according to the specifications for an adequate diet at minimum cost.

3. A larger consumption of low-cost fruits and vegetables would have provided more adequate minerals and vitamins.

4. The use of more whole grain cereals requiring cooking at home would have decreased the cost and increased

the food value of the diet.

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